**The radiative impact of clouds on the extratropical jet stream response to global warming**

Aiko Voigt, KIT

*Abstract*

Global warming is expected to lead to substantial changes in the extratropical jet streams. Yet, many quantitative aspects of jet stream changes remain uncertain, and recent work has indicated a potentially important role of cloud-radiative interactions. In this talk, I will investigate how cloud-radiative changes impact the extratropical circulation response using a hierarchy of global atmosphere models. I will first focus on aquaplanet setups with prescribed sea-surface temperatures (SSTs), which reproduce the model spread found in realistic simulations with interactive SSTs. Simulations with the two comprehensive global atmosphere models MPI-ESM and IPSL-CM5A and prescribed clouds show that half of the circulation response can be attributed to cloud changes. The rise of tropical high-level clouds and the upward and poleward movement of midlatitude high-level clouds lead to poleward jet shifts. High-latitude low-level cloud changes shift the jet poleward in one model but not in the other. Importantly, the radiative impact of clouds on the jet operates via the atmospheric cloud-radiative forcing and can be qualitatively reproduced in a dry Held-Suarez model, creating a link to previous dry modelling work and theories of the atmospheric circulation. I will then provide evidence that the aquaplanet results also hold in a realistic setup that includes continents and seasonality. At the end of the talk, I will highlight some of the ongoing work that I am currently pursuing in my junior research group on "Clouds and Storm Tracks" at the Karlsruhe Institute of Technology. This work complements the presented global modelling approach by studying the cloud impact on the evolution of individual cyclones and by pursuing ultra high-resolution simulations to better understand cloud processes and their coupling with the extratropical circulation.